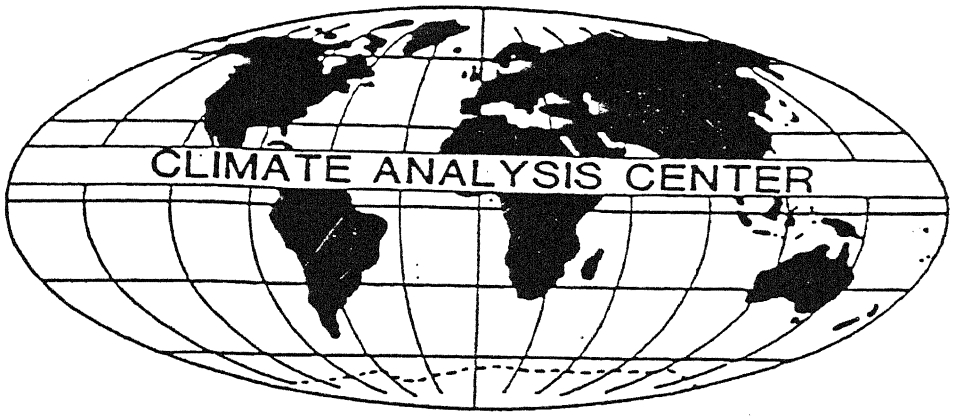


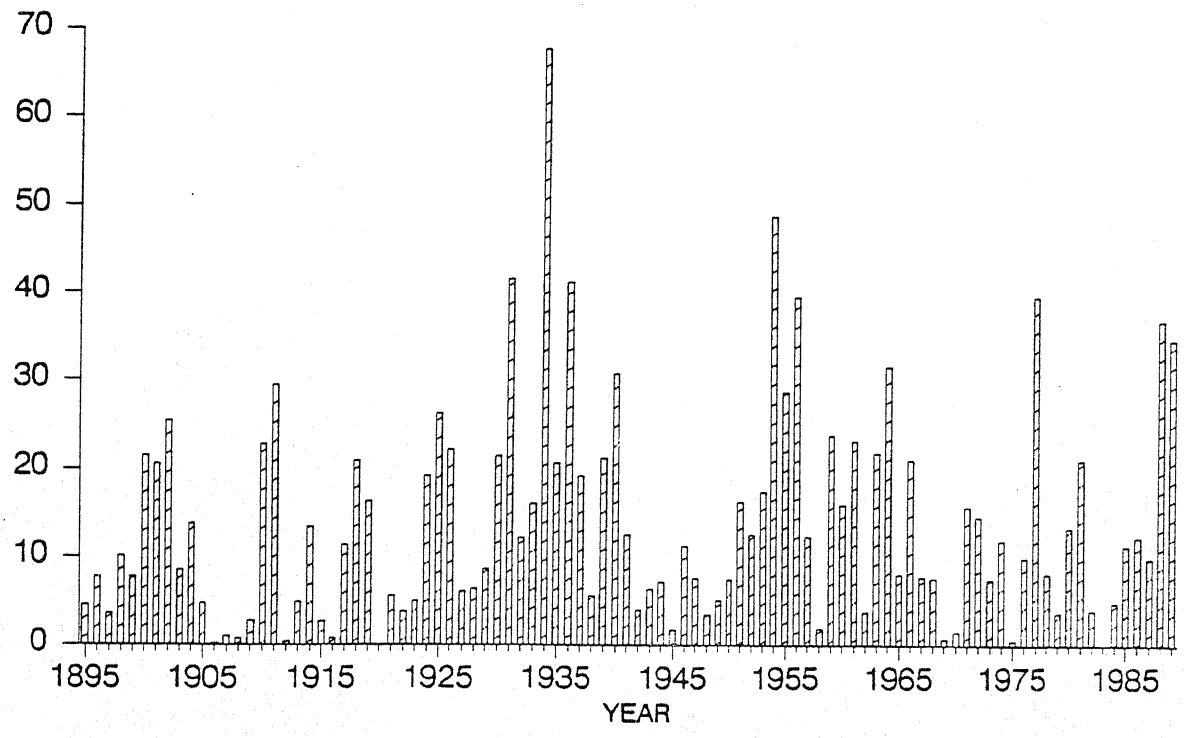
CONTAINS:
JULY 1989
UNITED
STATES
CLIMATE
SUMMARY

EEKLY CLIMATE BULLETIN

)9/31 Washington, DC August 5, 1989

U.S. NATIONAL - JULY

PERCENT AREA IN SVR/EXT DROUGHT



National Climatic Data Center, NOAA

WITH COPIOUS MAY-JULY RAINFALL IN MUCH OF THE SOUTH AND EAST, OVER A OF THE CONTIGUOUS U.S., MOST NOTABLY THE WEST AND THE NORTHERN GREAT NS, STILL EXPERIENCIED SEVERE TO EXTREME DROUGHT. THE PERCENT OF THE NTRY IN SEVERE TO EXTREME LONG-TERM DRYNESS HAS STEADILY INCREASED THE FOUR MONTHS, AND HAS ALMOST REACHED THE MAGNITUDE OF THE 1988 DROUGHT S SUMMER PEAK.

UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE - NATIONAL METEOROLOGICAL CENTER

WEEKLY CLIMATE BULLETIN

This Bulletin is issued weekly by the Climate Analysis Center and is designed to indicate, in a brief concise format, current surface climatic conditions in the United States and around the world. The Bulletin contains:

- Highlights of major climatic events and anomalies.
- U.S. climatic conditions for the previous week.
- U.S. apparent temperatures (summer) or wind chill (winter).
- U.S. cooling degree days (summer) or heating degree days (winter).
- Global two-week temperature anomalies.
- Global four-week precipitation anomalies.
- Global monthly temperature and precipitation anomalies.
- Global three-month precipitation anomalies (once a month).
- Global twelve-month precipitation anomalies (every three months).
- Global three-month temperature anomalies for winter and summer seasons.
- Special climate summaries, explanations, etc. (as appropriate).

Most analyses contained in this Bulletin are based on preliminary, unchecked data received at the Climate Analysis Center via the Global Telecommunications System. Similar analyses based on final, checked data are likely to differ to some extent from those presented here.

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GLOBAL CLIMATE HIGHLIGHTS

MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF AUGUST 5, 1989

1. Interior of the Northwestern United States:

EXTREME HEAT SUBSIDES

Cooler air that invaded the area last week dropped average temperatures as much as 6^0C below normal. The cooler conditions should diminish the forest fire threat that was a major concern in previous weeks [Ending at 2 weeks].

2. North Central United States:

MODERATE RAINS PERSIST

Up to 62 mm of rain was recorded as scattered showers continued across the area. This pattern of scattered rains that has prevailed in recent weeks has improved short-term moisture conditions; however, long-term deficiencies remained at many stations [Ended at 19 weeks].

3. Caribbean Islands:

PRECIPITATION DEFICITS ACCUMULATING RAPIDLY

Generally 5 to 10 mm of rain fell on the windward and leeward islands of the eastern Caribbean. A lack of tropical convective activity in the area has not produced the abundant rains that normally fall during the summer [8 weeks].

4. United Kingdom:

RAINFALL VERY SHORT

Precipitation varied from 5 to 10 mm across the U.K., with only a few reports approaching 20 mm. Recent weeks of little rainfall have not eased drought conditions which are the worst, most notably in southern England, since 1976 [5 weeks].

5. Western Europe:

NO REPRIEVE FROM THE HEAT

Warm weather dominated the area as highs reached 44^0C in Spain and temperatures averaged up to 5^0C above normal in Portugal [4 weeks].

6. Japan:

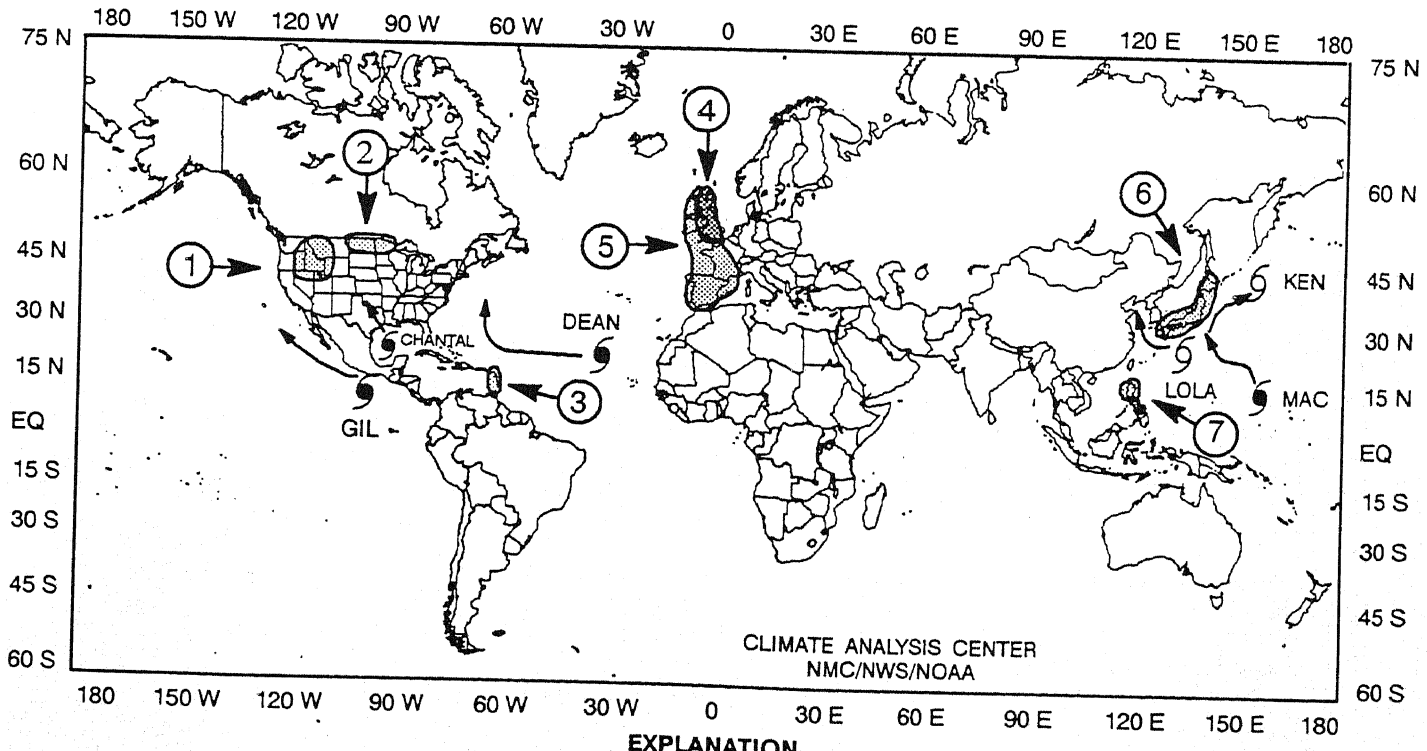
HEAVY RAINS REPORTED

Tropical Storms Ken and Lola thrashed Japan with strong winds and torrential rains, especially along the Pacific coast of Honshu near Tokyo and on the southern island of Kyushu. Rainfall amounts averaged between 200 and 300 mm in these areas, with a maximum report of 322 mm in Kyushu [Episodic Event].

7. The Philippines:

TROPICAL STORMS PRODUCE FLOODS

A combination of tropical storm activity and the normal occurrence of the western monsoon season along the South China Sea Coast of Luzon has dropped abundant rains on many locations in the northern island. Two weeks ago, up to 519 mm was received, while amounts approached 416 mm during the past week. General rainfall amounts varied from 150 to 250 mm at most locations [Episodic Event].



EXPLANATION

TEXT: Approximate duration of anomalies is in brackets. Precipitation amounts and temperature departures are this week's values.

MAP: Approximate locations of major anomalies and episodic events are shown. See other maps in this Bulletin for current two week temperature anomalies, four week precipitation anomalies, long-term anomalies, and other details.

UNITED STATES WEEKLY CLIMATE HIGHLIGHTS

FOR THE WEEK OF JULY 30 THROUGH AUGUST 5, 1989.

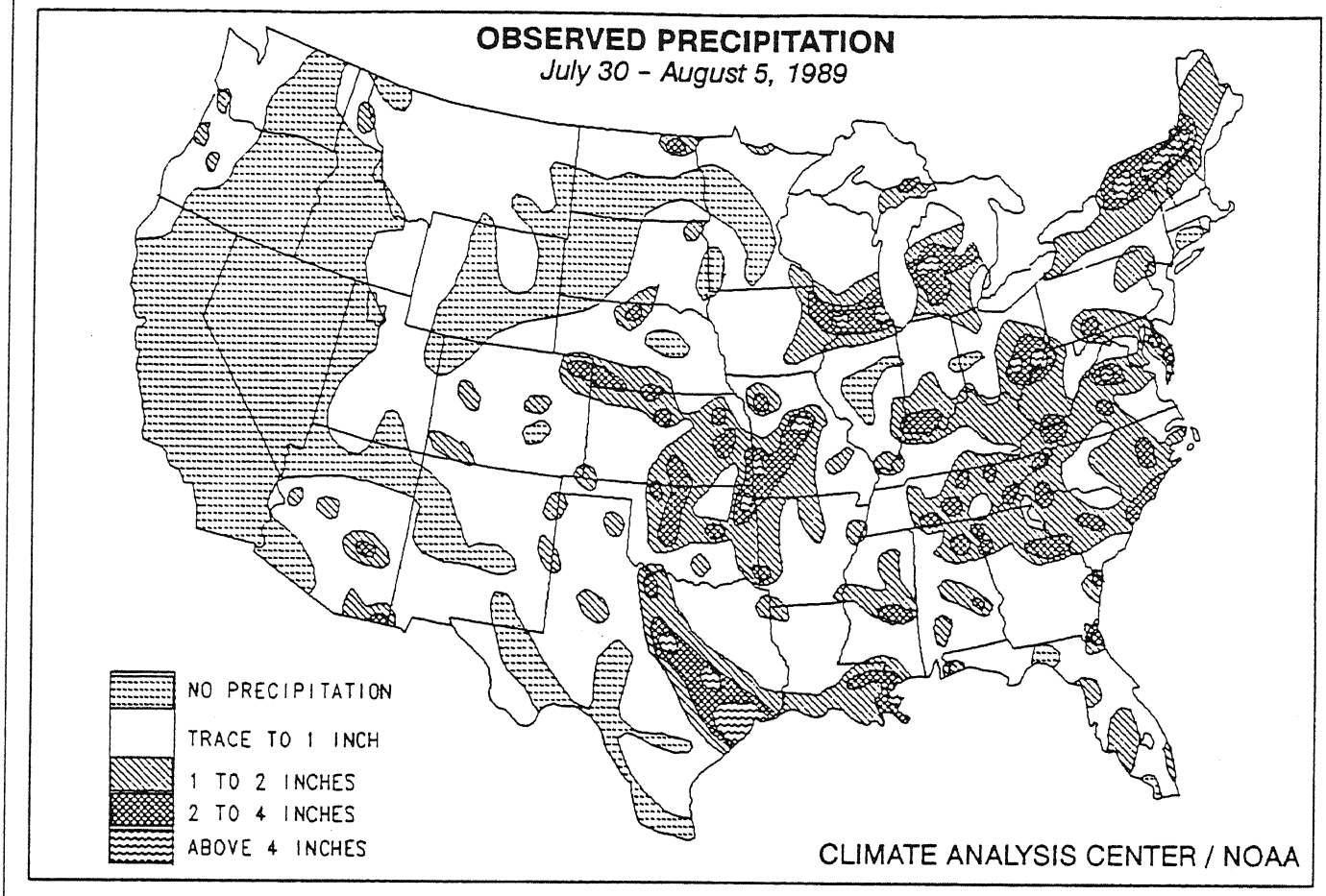
Last week featured a dry, upper-level ridge in the western and north-central U.S., a storm system that moved from the central Plains northeastward into Quebec, a tropical air mass that covered the eastern third of the nation, and Hurricane Chantal. The ridge of high pressure in the western and north-central states kept warm, dry air across most of the region. Excessive heat ended in the Southwest and southern Rockies, but unusual warmth enveloped much of the northern Rockies and Plains, Great Lakes, and western New England. Parts of the northern Great Plains have now experienced seven consecutive weeks of above normal temperatures. Farther east, a weak storm system and an associated cold front triggered scattered but intense thunderstorms in the central Plains, the southern and eastern Great Lakes, the lower Ohio Valley, southern Appalachians, and the Southeast. On Monday, a tropical depression in the Gulf of Mexico rapidly intensified into Hurricane Chantal before making landfall near Galveston, TX on Tuesday morning. Torrential rains, with winds gusting up to 85 mph, and several tornadoes battered portions of southeastern Texas. Chantal quickly lost strength, however, and was classified as a non-tropical system before it reached Oklahoma. Around mid-week, tropical air invaded the eastern third of the U.S.; this promoted the development of isolated, intense, slow-moving thunderstorms from the eastern Corn Belt southeastward to the southern Atlantic Coast. During the end of the week, leftover moisture from Chantal spread scattered rains from the central Great Plains northeastward to the Great Lakes. Simultaneously, an unseasonably strong but relatively dry cold front dropped southeastward out of Canada into the northern Rockies and Plains. Interaction between the remnants of Chantal and the cold front created strong thunderstorms across western New England. Unfortunately, the badly-needed rains were also accompanied by flash floods. Warm and dry weather prevailed across most of Alaska, although heavy rains swept through the south-central and southeastern coastal locations, while seasonable conditions were generally reported throughout Hawaii.

According to the River Forecast Centers, the heaviest rain fell in association with Hurricane Chantal. Up to 9.6 inches were recorded near the Houston metropolitan area while 4 to 9 inches occurred from Galveston northwestward to College Station, TX. More than 5 inches of rain were measured at a few stations in eastern Arizona from isolated heavy monsoonal showers, but convective activity decreased in the remainder of the central and southern Rockies as compared to the previous week. In the Northeast, the first substantial rainfall (between 2 and 6 inches) during the past 8 weeks soaked the northern halves of New York, Vermont, New Hampshire, and Maine. Elsewhere, heavy rains were reported at scattered locations in the central Great Plains, from northern Illinois eastward into central Michigan, in the Tennessee and eastern Ohio Valleys, across the Southeast, and along the southeastern Alaskan coast (see Table 1). Light to moderate amounts were recorded throughout the remainder of the country east of the Mississippi, in the central Plains, the southern half of the Rockies, in parts of Montana, and along the Pacific Northwest Coast. Little or no precipitation fell along the southern half of the Pacific Coast, throughout the Intermountain West, and on the north-central Rockies, northern Great Plains, and the Rio Grande and upper Mississippi Valleys.

Extremely warm weather occurred from the northern Great Plains eastward to the upper Great Lakes. Highs ranged from the lower nineties in northern Michigan up to 105°F in sections of North Dakota and Minnesota while weekly temperatures generally averaged between 5°F and 8°F above normal (see Table 2). Near to above normal temperatures were observed in parts of the Southwest, in much of the northern Rockies, and across most of Alaska and the eastern half of the nation. In contrast, subnormal weekly temperatures were found throughout the Far West, the southern Rockies, the south-central Great Plains and lower Mississippi Valley, the mid-Atlantic, and in northern Maine. The greatest negative departures (between -5°F and -8°F) were observed in northern California, eastern Oregon, and southern Washington (see Table 3).

TABLE 1. Selected stations with 2.50 or more inches of precipitation for the week.

STATION	TOTAL (INCHES)
MUSKEGON, MI	3.49
JOPLIN, MO	3.41
JACKSONVILLE, FL	3.35
BURLINGTON, VT	3.08
EVANSVILLE, IN	2.74
COLLEGE STATION, TX	2.73
ROME/GRIFFISS AFB, NY	2.64
ASHEVILLE, NC	2.62
MASSENA, NY	2.60
CORDOVA/MILE 13, AK	2.58
CHERRY POINT MCAS, NC	2.58
MYRTLE BEACH AFB, SC	2.57
MERIDIAN, MS	2.55


OBSERVED PRECIPITATION
July 30 - August 5, 1989
NO PRECIPITATION
TRACE TO 1 INCH
1 TO 2 INCHES
2 TO 4 INCHES
ABOVE 4 INCHES
CLIMATE ANALYSIS CENTER / NOAA

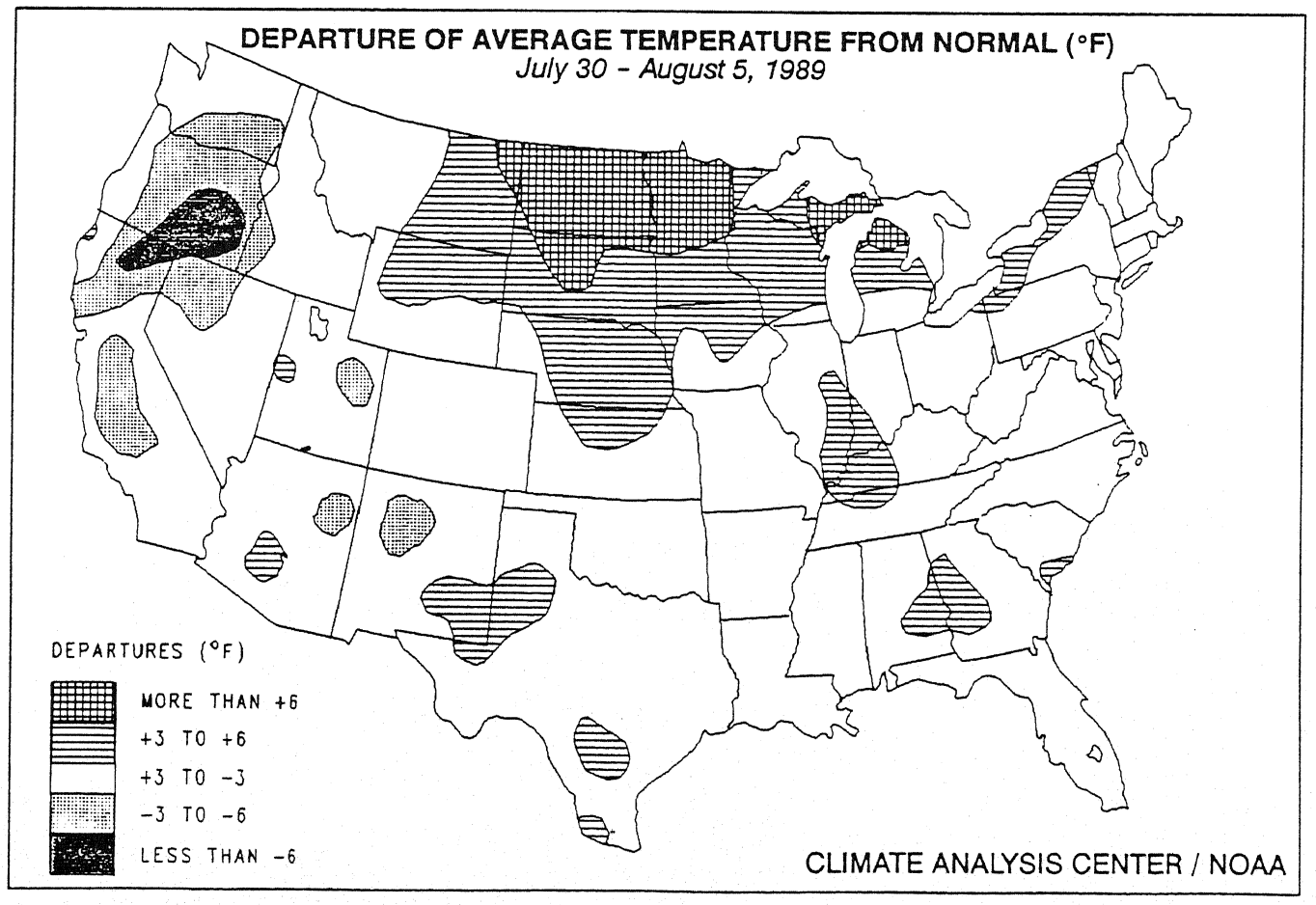

DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F)
July 30 - August 5, 1989
DEPARTURES (°F)
MORE THAN +6
+3 TO +6
+3 TO -3
-3 TO -6
LESS THAN -6
CLIMATE ANALYSIS CENTER / NOAA

TABLE 2. Selected stations with temperatures averaging 5.0°F or more ABOVE normal for the week.

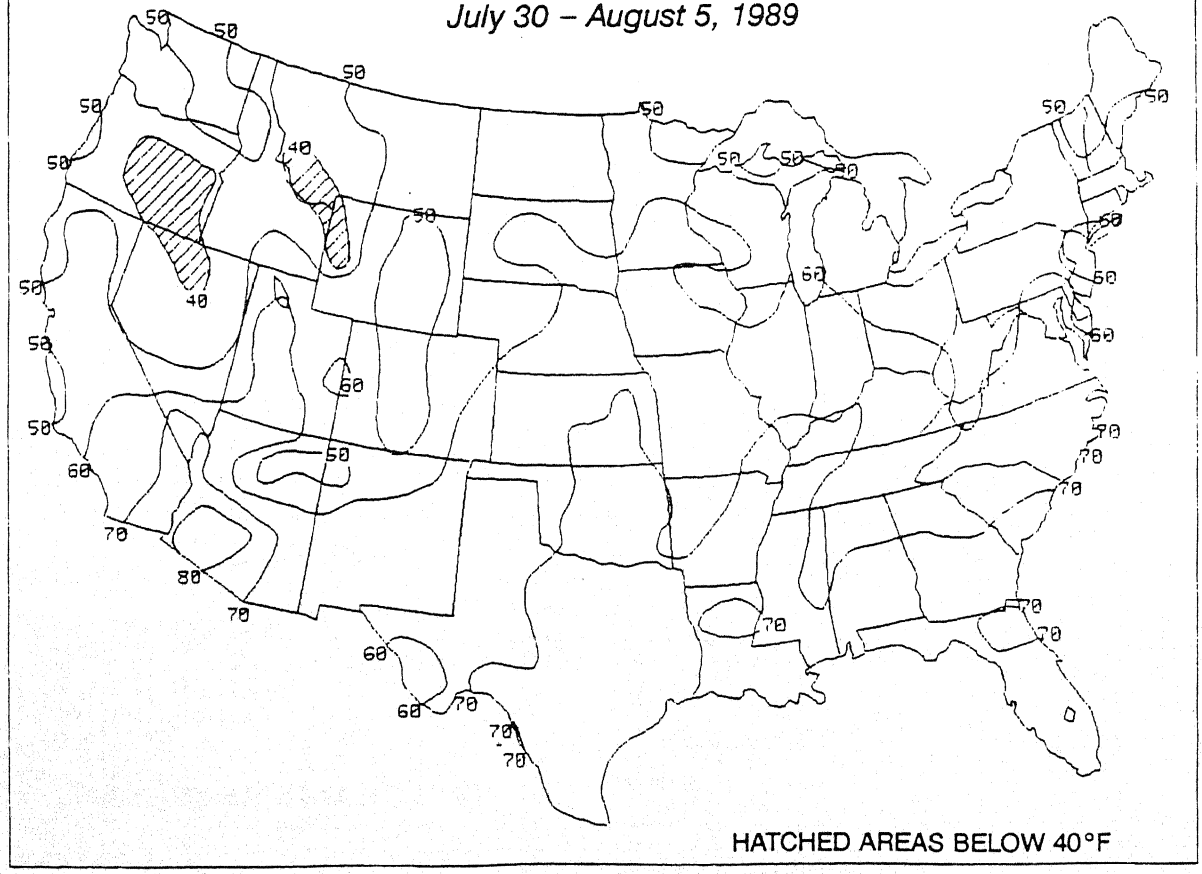
STATION	DEPARTURE (°F)	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
BARROW, AK	+11.0	50.4	ALPENA, MI	+6.3	73.0
GRAND FORKS, ND	+8.0	77.2	MARQUETTE, MI	+6.3	70.9
FARGO, ND	+7.2	78.5	SAULT STE. MARIE, MI	+6.3	70.8
WILLISTON, ND	+7.1	78.3	HOUGHTON LAKE, MI	+6.2	73.2
PELLSTON, MI	+7.1	72.9	ABERDEEN, SD	+6.1	78.9
ALEXANDRIA, MN	+7.0	77.8	WORLAND, WY	+5.9	77.6
ESCENABA, MI	+6.9	73.8	INTERNATIONAL FALLS, MN	+5.8	71.7
MINOT, ND	+6.6	76.7	ST. CLOUD, MN	+5.7	76.2
PIERRE, SD	+6.5	82.4	HANCOCK/HOUGHTON CO., MI	+5.7	71.0
BISMARCK, ND	+6.5	77.8	DICKINSON, ND	+5.5	76.1
JAMESTOWN, ND	+6.5	77.2	GREEN BAY, WI	+5.2	74.8
DULUTH, MN	+6.4	71.8	SIOUX FALLS, SD	+5.1	79.5

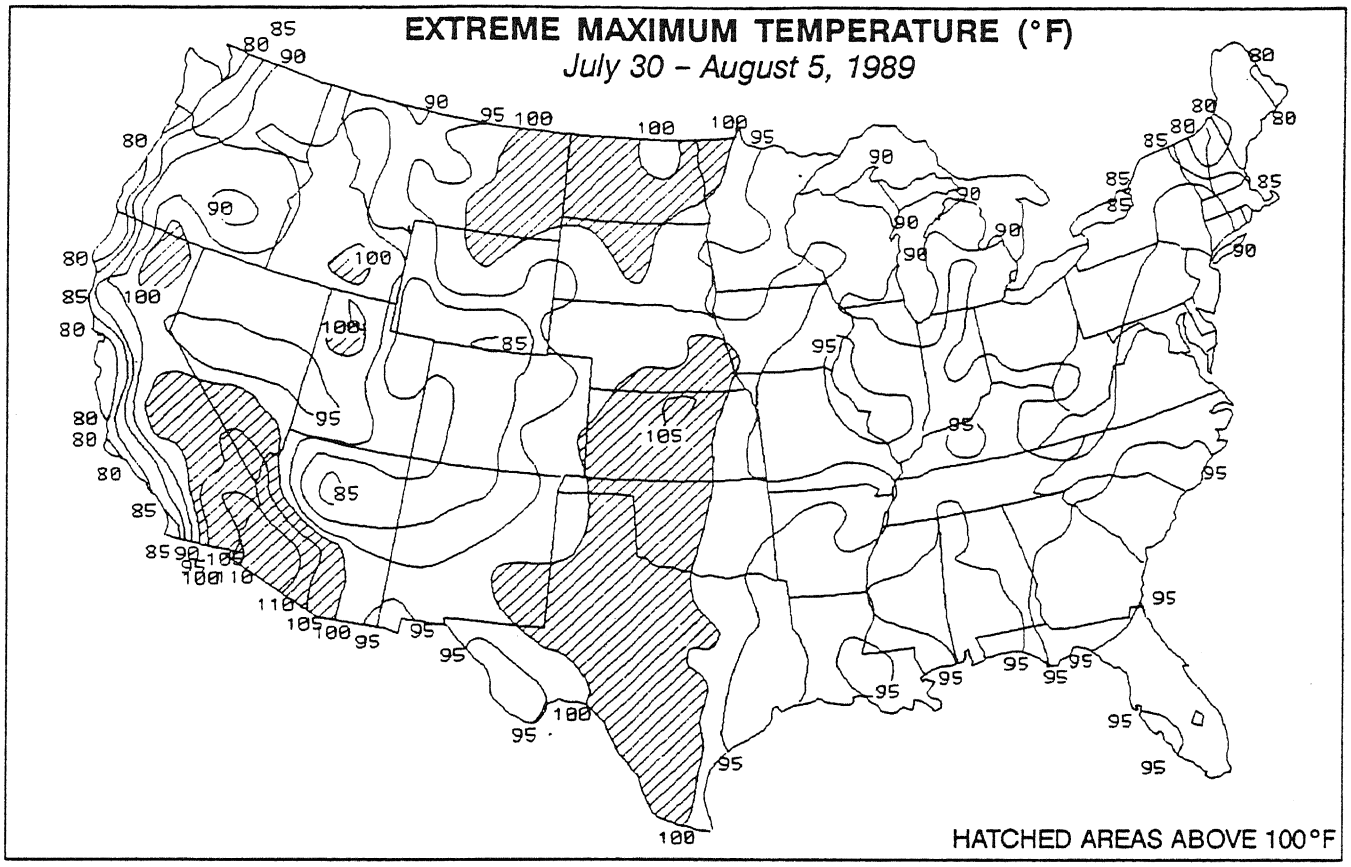
TABLE 3. Selected stations with temperatures averaging 2.0°F or more BELOW normal for the week.

STATION	DEPARTURE (°F)	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
BURNS, OR	-7.8	62.0	LOVELOCK, NV	-3.4	71.2
REDDING, CA	-6.9	76.1	PASO ROBLES, CA	-2.9	71.4
BAKERSFIELD, CA	-5.6	78.5	WENATCHEE, WA	-2.8	71.5
PENDLETON, OR	-5.3	68.7	ALBUQUERQUE, NM	-2.8	75.6
WALLA WALLA, WA	-4.5	71.7	EUGENE, OR	-2.4	64.9
REDMOND, OR	-4.4	61.7	FARMINGTON, NM	-2.2	73.1
YAKIMA, WA	-4.3	66.2	HARRISBURG, PA	-2.2	73.5
MEDFORD, OR	-3.8	69.1	SALISBURY, MD	-2.2	74.7
SPOKANE, WA	-3.7	66.5	MILLVILLE, NJ	-2.1	74.1
WINNEMUCCA, NV	-3.7	68.1	BALTIMORE, MD	-2.1	74.9
PORTLAND, OR	-3.6	64.7	FRESNO, CA	-2.1	78.5
BOISE, ID	-3.6	71.1	LUFKIN, TX	-2.1	81.7
SALEM, OR	-3.4	63.6	ELKO, NV	-2.0	68.4

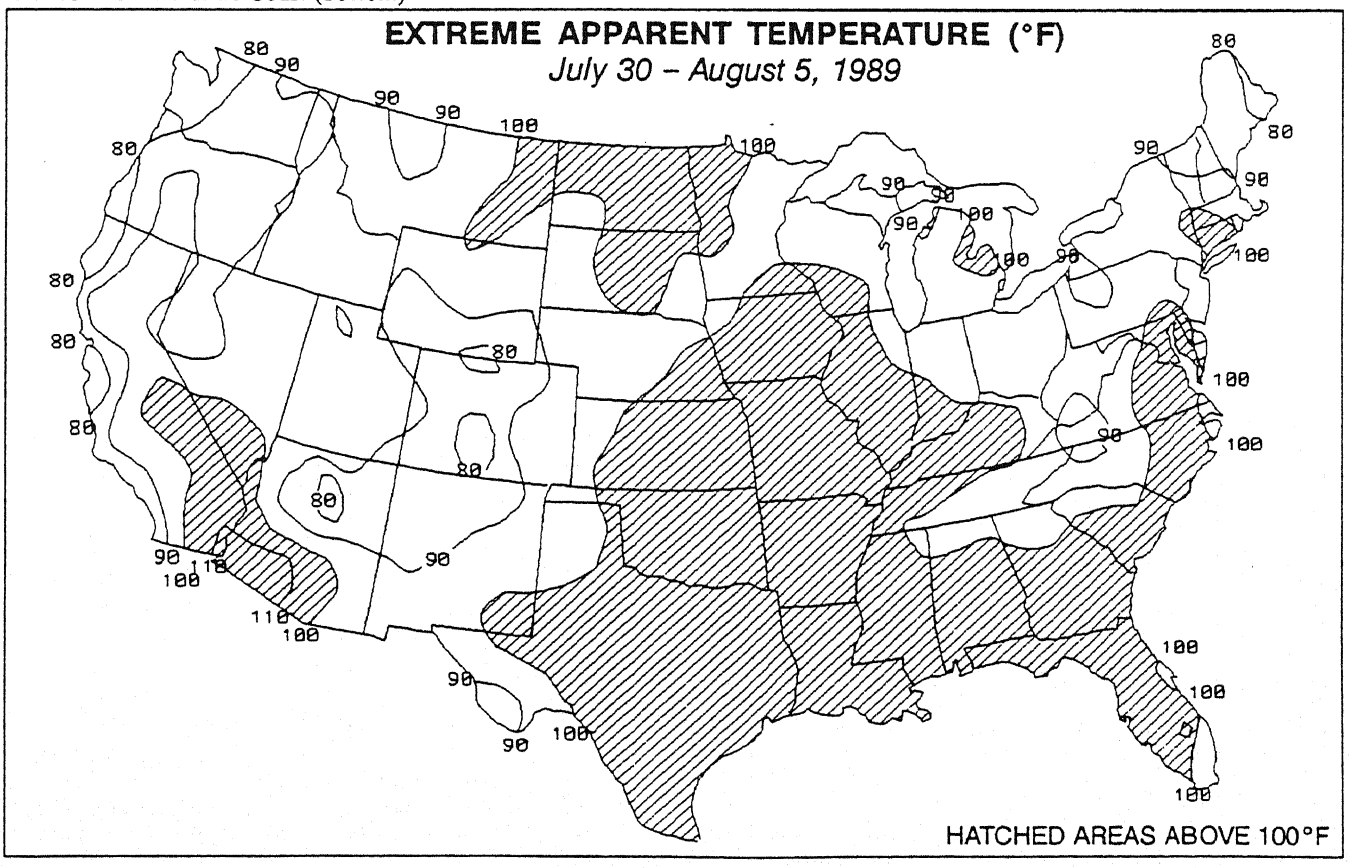
EXTREME MINIMUM TEMPERATURE (°F)

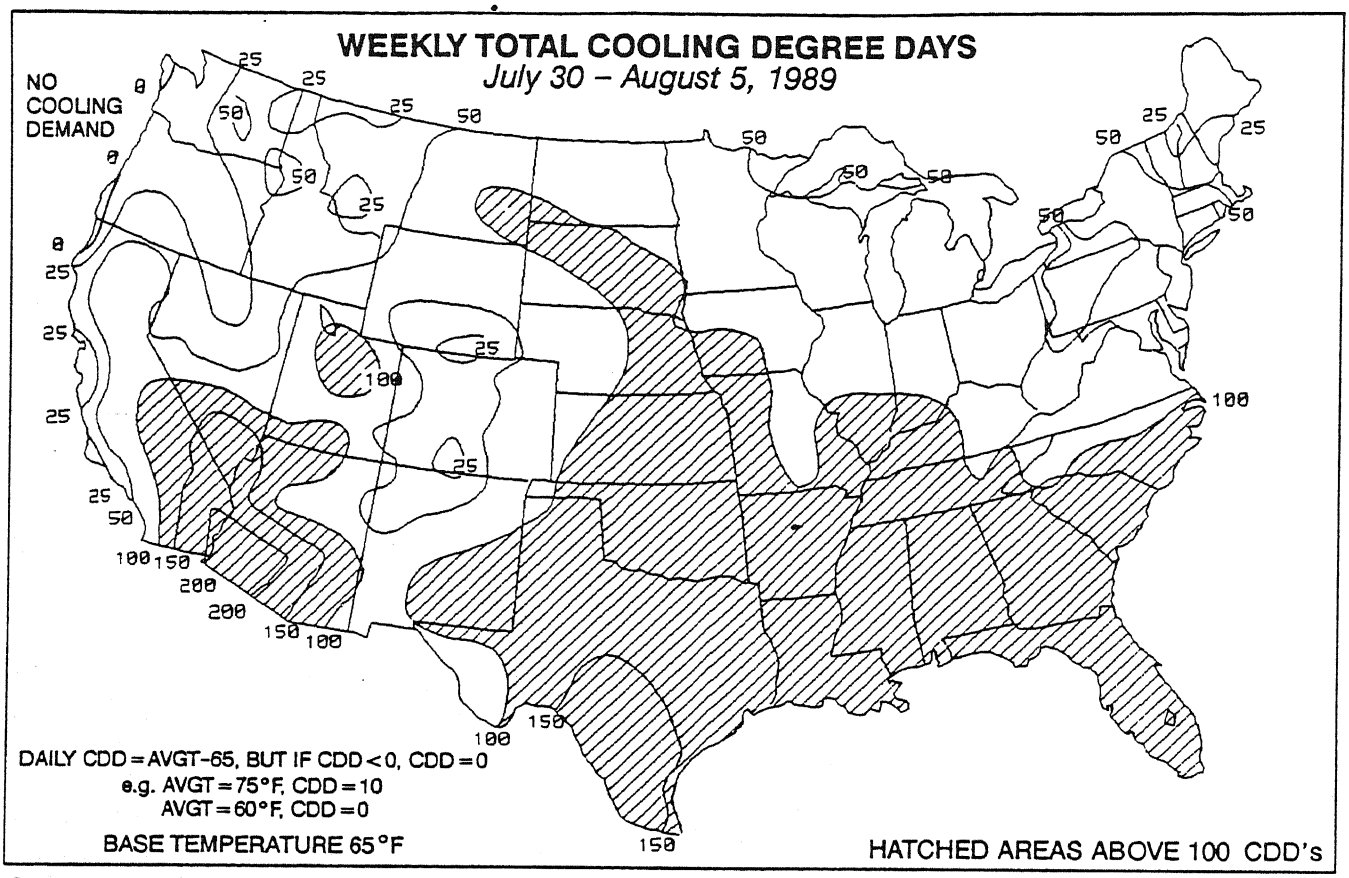
July 30 – August 5, 1989



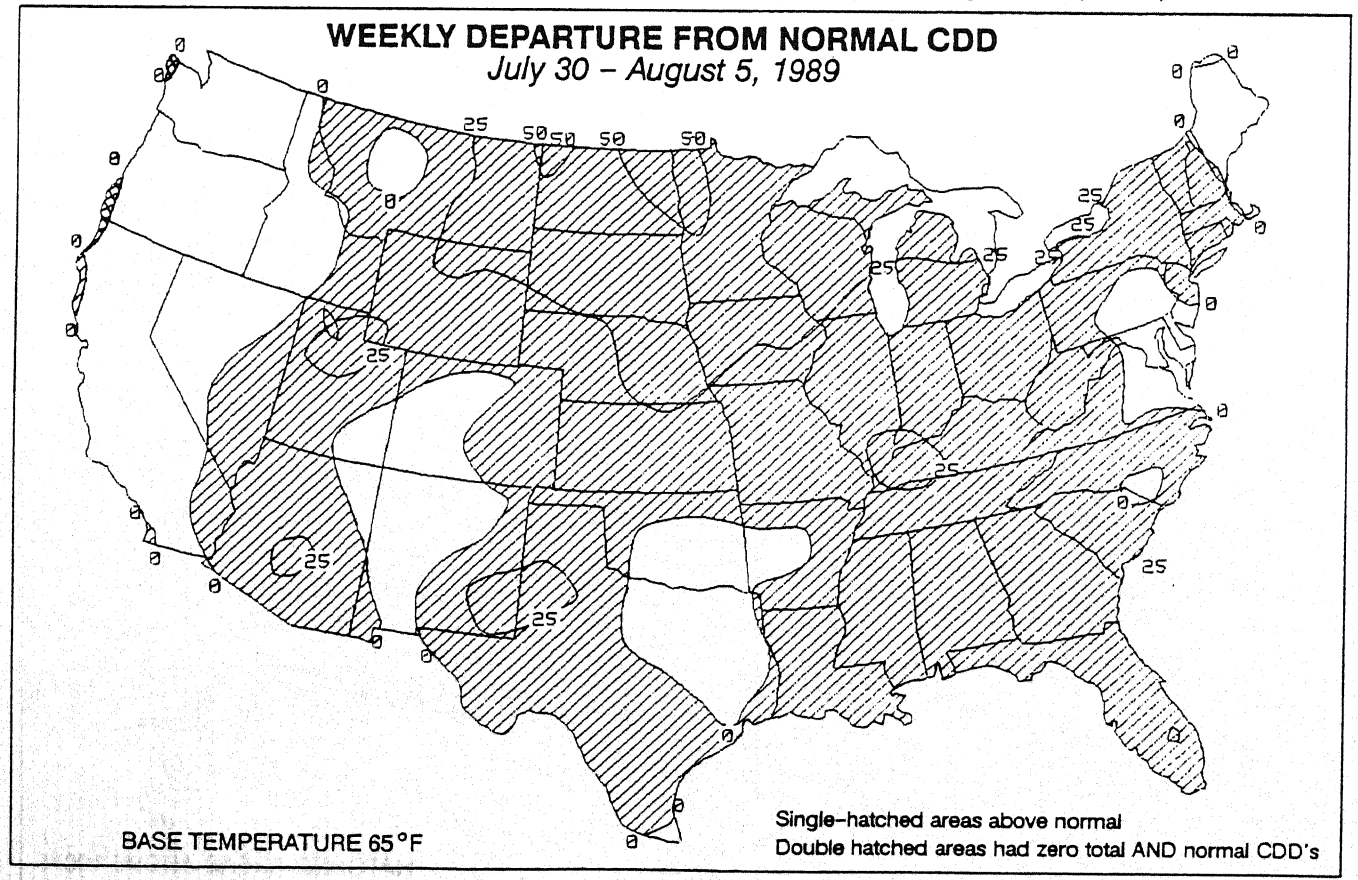


Triple digit readings occurred across most of the Plains, the desert Southwest, and in northern California while highs in the nineties were common throughout the nation with the exception of the Northeast, eastern Ohio Valley, and central Rockies (top). The heat and humidity produced dangerous apparent temperatures (105°F) in the lower and middle Mississippi Valleys and along the Gulf and southern Atlantic Coast (bottom).



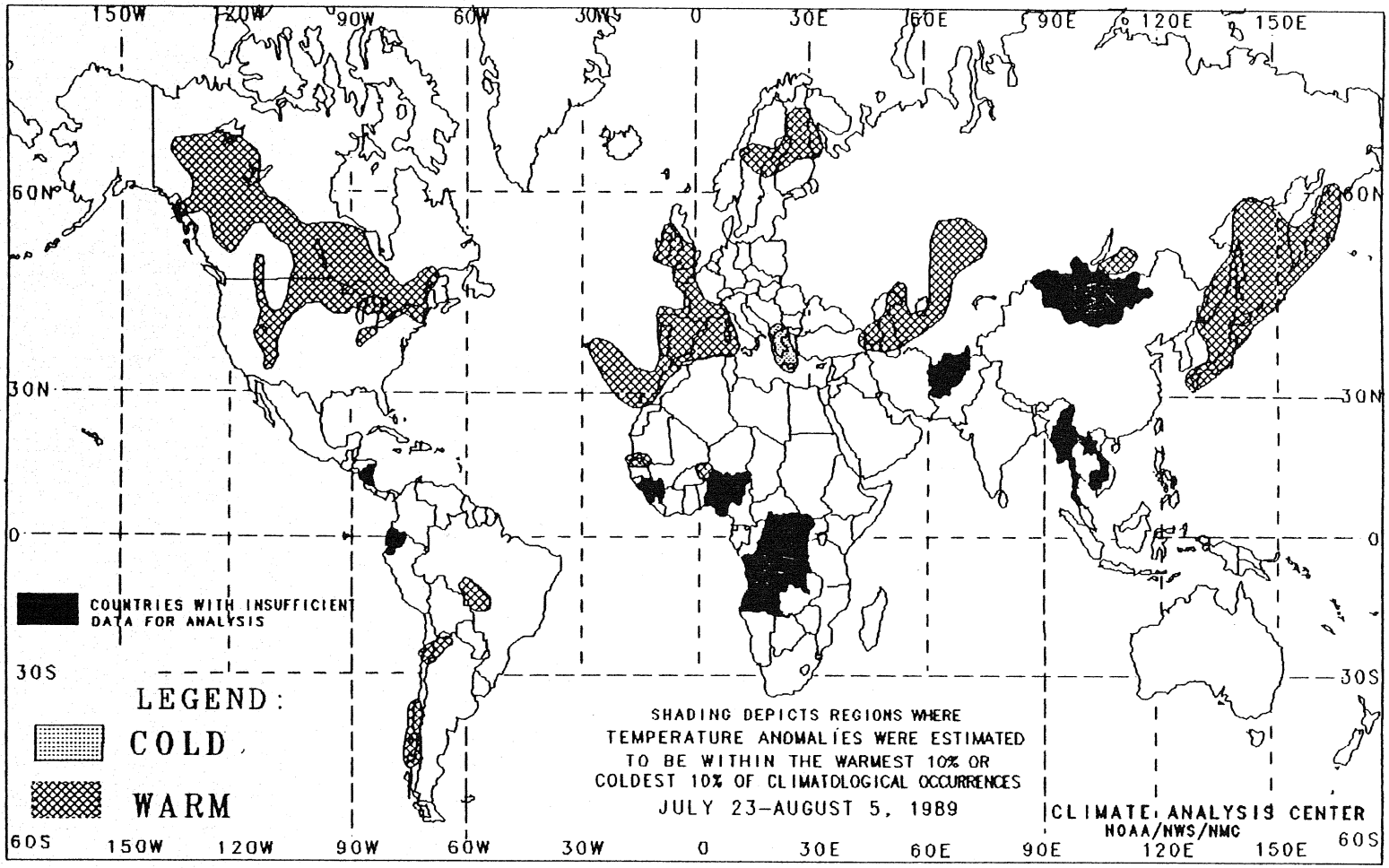


Seasonably warm weather in the Southwest and Southeast, along with above normal temperatures in the north-central U.S., pushed weekly total CDD's over 100 (top). Much of the nation, with the exception of the West Coast, the mid-Atlantic, northern New England, and southern Rockies and Great Plains experienced above-normal air conditioning demand (bottom).



GLOBAL TEMPERATURE ANOMALIES

2 WEEKS



The anomalies on this chart are based on approximately 2500 observing stations for which at least 13 days of temperature observations were received from synoptic reports. Many stations do not operate on a twenty-four hour basis so many night time observations are not taken. As a result of these missing observations the estimated minimum temperature may have a warm bias. This in turn may have resulted in an overestimation of the extent of some warm anomalies.

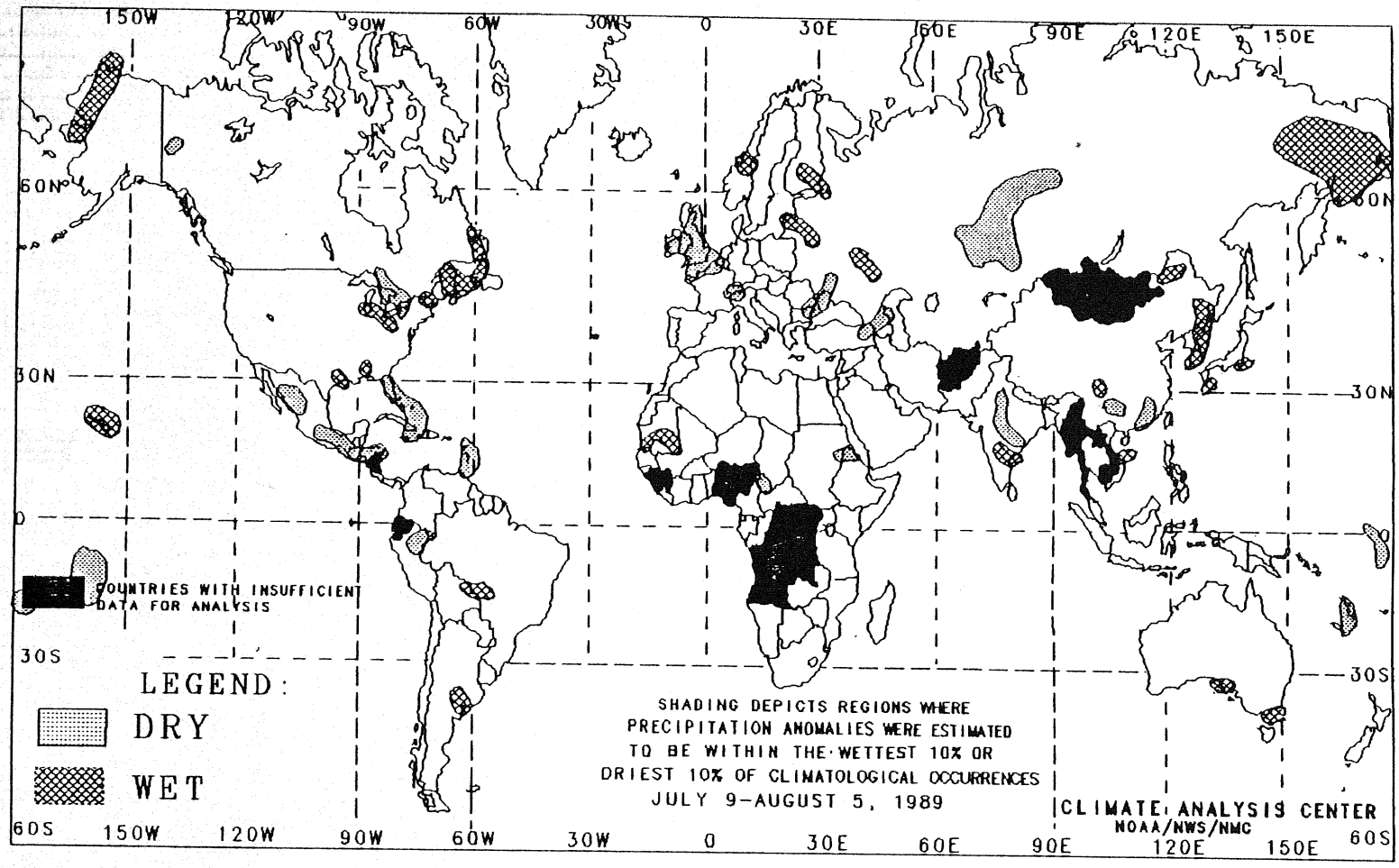
Temperature anomalies are not depicted unless the magnitude of temperature departures from normal exceeds 1.5°C.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

This chart shows general areas of two week temperature anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

GLOBAL PRECIPITATION ANOMALIES

4 WEEKS



The anomalies on this chart are based on approximately 2500 observing stations for which at least 27 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the four week period is less than 20 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total four week precipitation exceeds 50 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of four week precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

UNITED STATES MONTHLY CLIMATE SUMMARY

JULY 1989

The wet and slightly cooler than normal conditions that affected most of the South and East during June continued into July, while excessively hot and dry weather in the Southwest finally eased towards the end of the month. The remnants of Tropical Storm Allison spread numerous showers and thunderstorms from the central Gulf Coast northward to the lower Ohio Valley during the first few days of July. Later on, a broad trough of low pressure covering much of the South and East triggered widespread convective activity, causing localized flooding in parts of the mid-Atlantic and southern Appalachians. In contrast, a strong ridge of high pressure anchored over the southern Rockies kept most of the West hot and dry. Dozens of stations tied or set new daily maximum temperature records, and many locations also established new July and/or all-time record highs (see Tables 6 and 7). During the middle of the month, typical mid-summer conditions, with scattered showers and thunderstorms and occasional heat and humidity, prevailed across the eastern half of the country. Some areas, such as the Northeast, however, experienced severe weather. A total of 10 tornadoes touched down in Massachusetts, New York, and New Jersey, and many sites reported damaging winds and large hail. Elsewhere, localized downpours produced flash flooding in parts of central Wisconsin, southwestern Michigan, northern Indiana, and southern Louisiana. Towards the end of July, a series of slow-moving cold fronts generated abundant showers and thunderstorms throughout the eastern half of the U.S. The Southwest received some relief from dryness and the heat as scattered monsoonal showers and cooler air moved into the region and persisted through the end of the month. In Hawaii, Tropical Storm Dalilia, which passed 160 miles to the south of Honolulu on July 21, was responsible for gusty winds, rough surf, and heavy rains across most of the islands. Farther north, timely and ample July rainfall in Alaska controlled or extinguished forest fires that burned nearly 35,000 acres of the state's interior. On July 31, two tropical depressions, one in the Gulf of Mexico and one in the Atlantic Ocean, rapidly intensified into Hurricane Chantal and Tropical Storm Dean, respectively. As August commenced, Chantal was bearing down on the upper Texas coast.

According to the River Forecast Centers, the greatest monthly totals occurred in portions of the lower Mississippi Valley, the Southeast, and the Appalachians. Between 10 and 15 inches of rain fell on stations in southern Arkansas and Louisiana, in sections of Mississippi, Alabama, and Georgia, the Florida panhandle, and from the western Carolinas northeastward to central Pennsylvania (see Table 1). Locally heavy amounts (more than 10 inches) were found in southern New Jersey and northern Delaware, central Indiana, northern Illinois, southwestern Florida, and Hawaii. For the third consecutive month, above normal precipitation was recorded at most locations in the lower Mississippi Valley, the Southeast, and mid-Atlantic regions (see Figures 1 and 2). Portions of the south-central Great Plains and the Northeast have also experienced ample rainfall for three straight months. In the latter area, the abundant May-July rainfall has effectively eliminated deficits accumulated during the first quarter of this year (see Figure 3) and replenished wells and reservoirs. Near to above normal July rainfall was also observed in parts of the Pacific Northwest, the northern and central Rockies, throughout Hawaii, and in the western, northern, and central areas of Alaska.

Many stations in the northern Great Plains, upper Midwest, and the Great Lakes region measured less than half the normal July precipitation (see Tables 2 and 5). Subnormal monthly rainfall was also observed in parts of the central and northern Appalachians, northern New England, eastern Florida, the southern Great Plains, throughout the High Plains, along the southeastern Alaskan coast, and in most of the seasonably dry Far West (see Figures 1 and 2). Wildfires continued to ravage thousands of acres of brush and forest in many western states; however, increased rainfall and lower temperatures towards the end of the month diminished wildfire conditions at most locations. Regionally, the Southwest and East North-Central recorded the eighth and twelfth driest July since 1895, according to the National Climatic Data Center (NCDC). On a local basis, over a third of the country is still experiencing severe to extreme long-term drought as only seven other July's have had larger areal drought values (see front cover). The percent of the nation in severe to extreme drought has steadily increased during the past four months, almost reaching the magnitude of the 1988 drought at its summer peak after a brief recovery last fall and winter.

Extremely warm weather during the first, third, and fourth weeks of July contributed to the fifth warmest July since 1895 in the West North-Central region, and hot conditions during the beginning and middle of the month in the Southwest led to the fourth warmest July during the past 95 years, according to the NCDC. In the contiguous U.S., July temperatures averaged above normal in the Southwest, the Rockies, the northern Great Plains, upper Midwest, Great Lakes, western New England, southern Texas, and along the southern Atlantic Coast (see Table 3, Figures 4 and 5). Farther north, readings in Alaska climbed into the eighties as several locations established new maximum daily, extreme, and average July temperature records (see Tables 6 and 7).

During the middle of July, a strong Canadian high pressure center brought cool air to the nation's midsection, while frequent cloudiness and abundant rainfall kept temperatures near normal the remainder of the month. As a result, July temperatures averaged between 2°F and 4°F below normal in the central Great Plains and lower Mississippi Valley (see Table 4, Figures 4 and 5). Regionally, it was the twentieth coolest July since 1895 in the South. Elsewhere, slightly cooler than normal conditions occurred in the Pacific Northwest, the mid-Atlantic, along coastal New England, and in much of the Southeast.

TABLE 1. JULY STATIONS WITH MORE THAN 150% OF NORMAL PRECIPITATION AND MORE THAN 8 INCHES OF PRECIPITATION; OR, STATIONS WITH MORE THAN 7 INCHES OF PRECIPITATION AND NO NORMALS.

STATION	TOTAL (INCHES)	PCT. OF NORMAL	STATION	TOTAL (INCHES)	PCT. OF NORMAL
HILO/LYMAN, HAWAII, HI	22.91	264.6	MILTON/WHITING NAS, FL	9.01	***
KOKEE, KAUAI, HI	14.89	623.0	MONTGOMERY, AL	8.79	184.7
WRIGHTSTOWN/MCGUIRE AFB, NJ	13.14	282.6	TUSCALOOSA, AL	8.59	175.7
BILOXI/KEESLER AFB, MS	13.12	186.1	ALTOONA, PA	8.58	194.1
MCCOMB, MS	12.75	***	SHREVEPORT/BARKSDALE AFB, LA	8.39	***
WILMINGTON, DE	12.16	311.8	BOWLING GREEN, KY	8.34	192.6
COLUMBUS, GA	11.54	209.8	LYNCHBURG, VA	8.30	215.6
MERIDIAN, MS	11.08	208.3	BIRMINGHAM, AL	8.25	153.6
PENSACOLA, FL	10.99	152.9	AUGUSTA, GA	8.16	186.3
PANAMA CITY/TYNDALL AFB, FL	10.26	***	ASHEVILLE, NC	8.12	213.1
ROANOKE, VA	10.09	294.2	FAYETTEVILLE/POPE AFB, NC	8.02	***
HICKORY, NC	10.08	234.4	DOTHAN, AL	7.98	***
CHATTANOOGA, TN	9.93	217.8	VALDOSTA/MOODY AFB, GA	7.83	***
MACON/WARNER-ROBINS AFB, GA	9.73	196.2	CRESTVIEW, FL	7.65	***
PHILADELPHIA, PA	9.44	245.2	FAYETTEVILLE/FT BRAGG AFB, NC	7.51	***
COLUMBIA, SC	9.41	175.9	JACKSONVILLE/CECIL NAS, FL	7.24	***
TAMPA/MAC DILL AFB, FL	9.04	***	NEW ORLEANS NAS, LA	7.21	***
PENSACOLA NAS, FL	9.04	***			

(Note: Stations without precipitation normals are indicated by asterisks.)

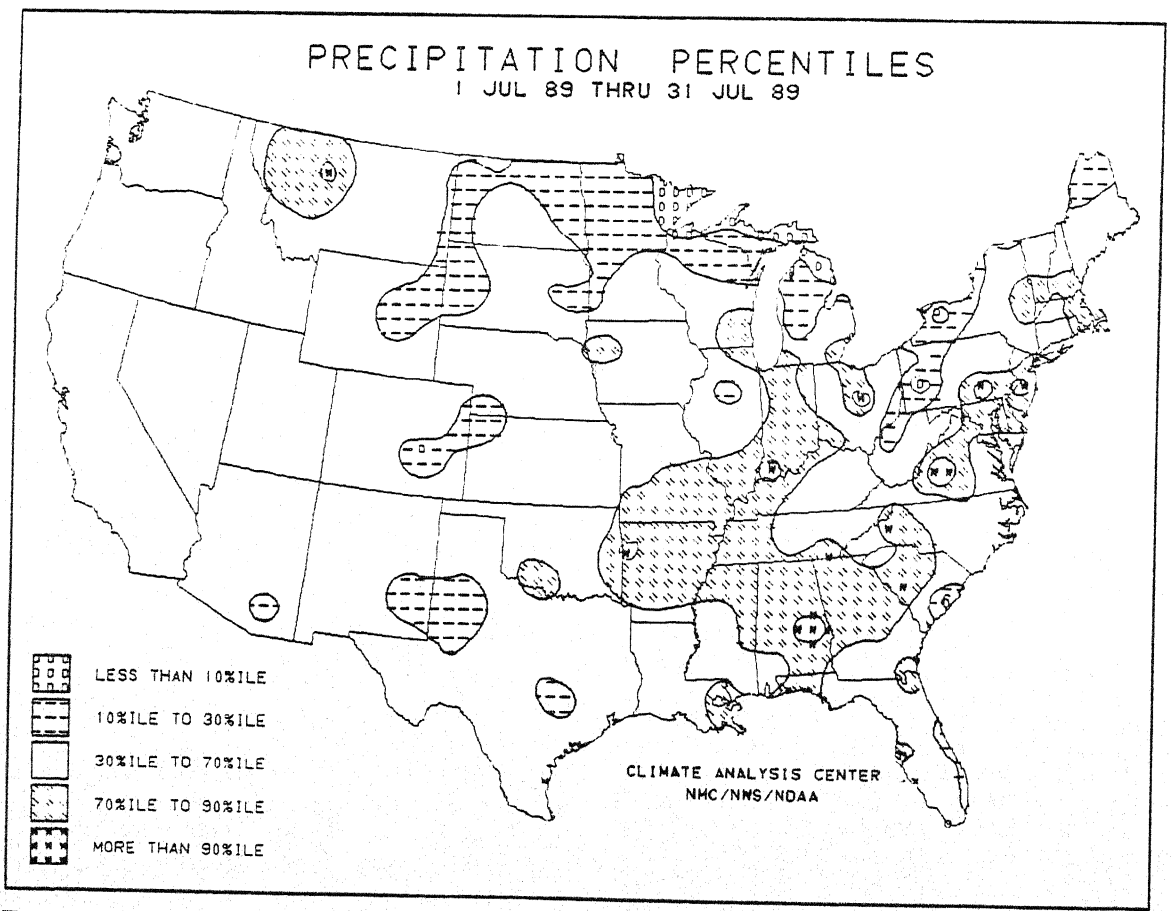


Figure 1. Precipitation percentiles for July 1989. Statistically significant heavy rainfall occurred in portions of the Ohio, Tennessee, and lower Mississippi Valleys, the mid-Atlantic, the Southeast, coastal New England, and the northern Rockies while extreme dryness was observed in the northern Plains, upper Midwest, and northern Great Lakes region.

TABLE 2. JULY STATIONS WITH LESS THAN 50% OF NORMAL PRECIPITATION THAT HAVE MORE THAN THREE INCHES OF NORMAL PRECIPITATION.

STATION	TOTAL (INCHES)	PCT. OF NORMAL	NORMAL (INCHES)	STATION	TOTAL (INCHES)	PCT. OF NORMAL	NORMAL (INCHES)
ALPENA, MI	0.22	7.1	3.11	BANGOR, ME	1.44	42.0	3.43
AUGUSTA, ME	0.38	11.4	3.33	INTERNATIONAL FALLS, MN	1.51	39.4	3.83
FARGO, ND	0.63	19.0	3.32	PITTSBURGH, PA	1.59	42.2	3.77
ALEXANDRIA, MN	0.77	25.3	3.04	POUGHKEEPSIE, NY	1.61	46.0	3.50
PARK FALLS, WI	0.79	19.6	4.02	SITKA, AK	1.82	39.5	4.61
RUMFORD, ME	0.87	22.7	3.84	CHARLESTON, SC	1.93	26.4	7.31
MARQUETTE, MI	0.91	28.4	3.21	QUINCY, IL	2.01	46.5	4.32
SPENCER, IA	0.97	25.6	3.79	ANNETTE ISLAND, AK	2.02	43.1	4.69
BRUNSWICK NAS, ME	1.07	31.9	3.36	JACKSON, KY	2.21	45.1	4.90
DULUTH, MN	1.09	27.7	3.94	DAYTONA BEACH, FL	2.44	44.2	5.52
ERIE, PA	1.35	39.8	3.39	BRUNSWICK, GA	2.78	45.1	6.16
CONCORDIA, KS	1.40	41.5	3.37	CORDOVA/MILE 13, AK	3.14	47.4	6.63

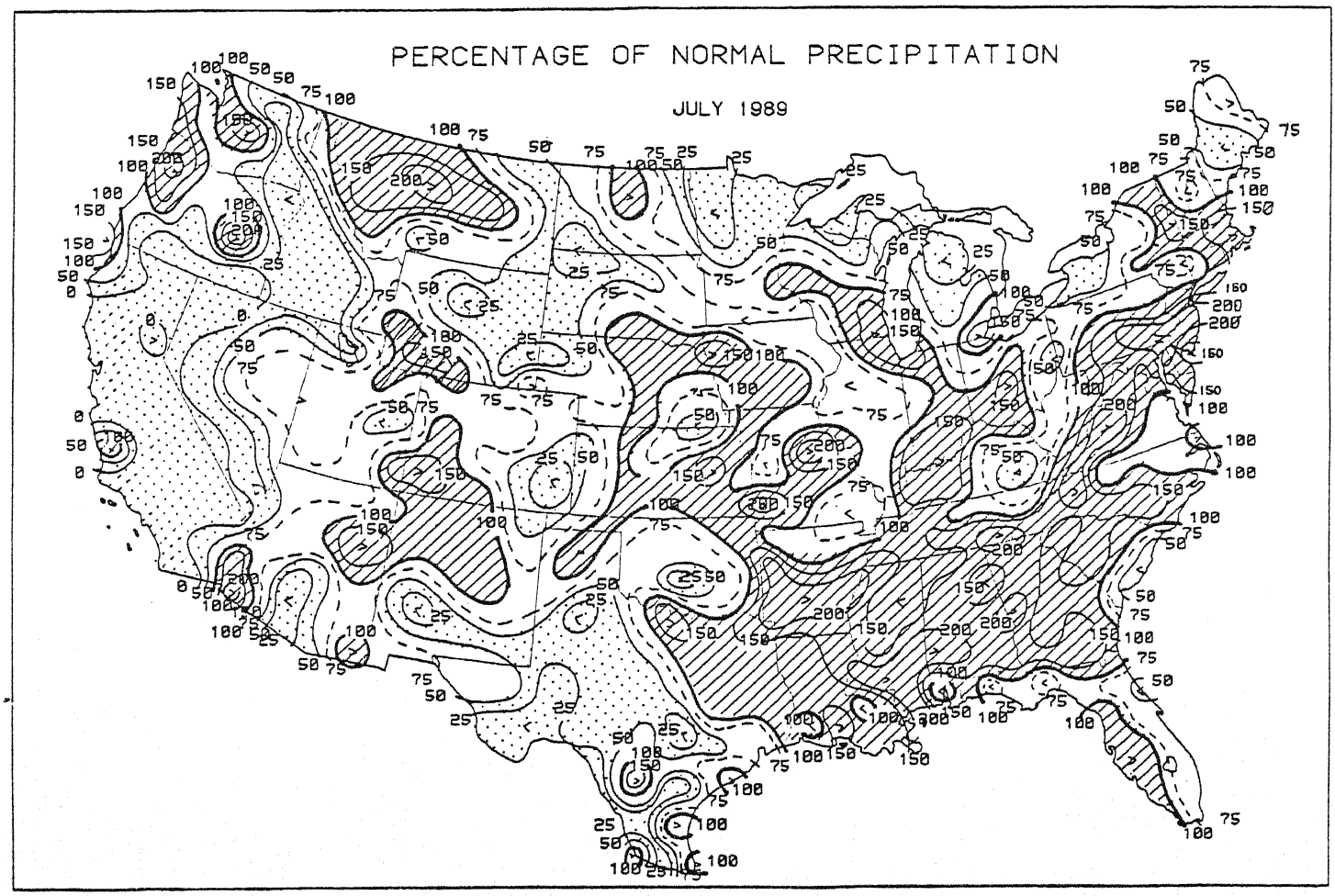


Figure 2. Percent of normal precipitation during July 1989. Dotted areas are less than 50%, and lined areas are above normal. For the third consecutive month, surplus rains fell on much of the South and East; however, abnormally dry weather continued in parts of the Great Plains, Midwest, and Rockies.

TEMPERATURE AND PRECIPITATION RANKINGS FOR JULY 1989, BASED ON THE PERIOD 1895 - 1989 (95 YEARS) WHERE 1 = DRIEST/COLDEST AND 95 = WETTEST/HOTTEST

REGION	*PRECIPITATION*	*TEMPERATURE*
NORTHEAST	46	41
EAST NORTH CENTRAL	12	78
CENTRAL	73	37
SOUTHEAST	74	43
WEST NORTH CENTRAL	21	91
SOUTH	41	20
SOUTHWEST	8	92
NORTHWEST	38	48
WEST	19	70
NATIONAL	23	78

National Climatic Data Center

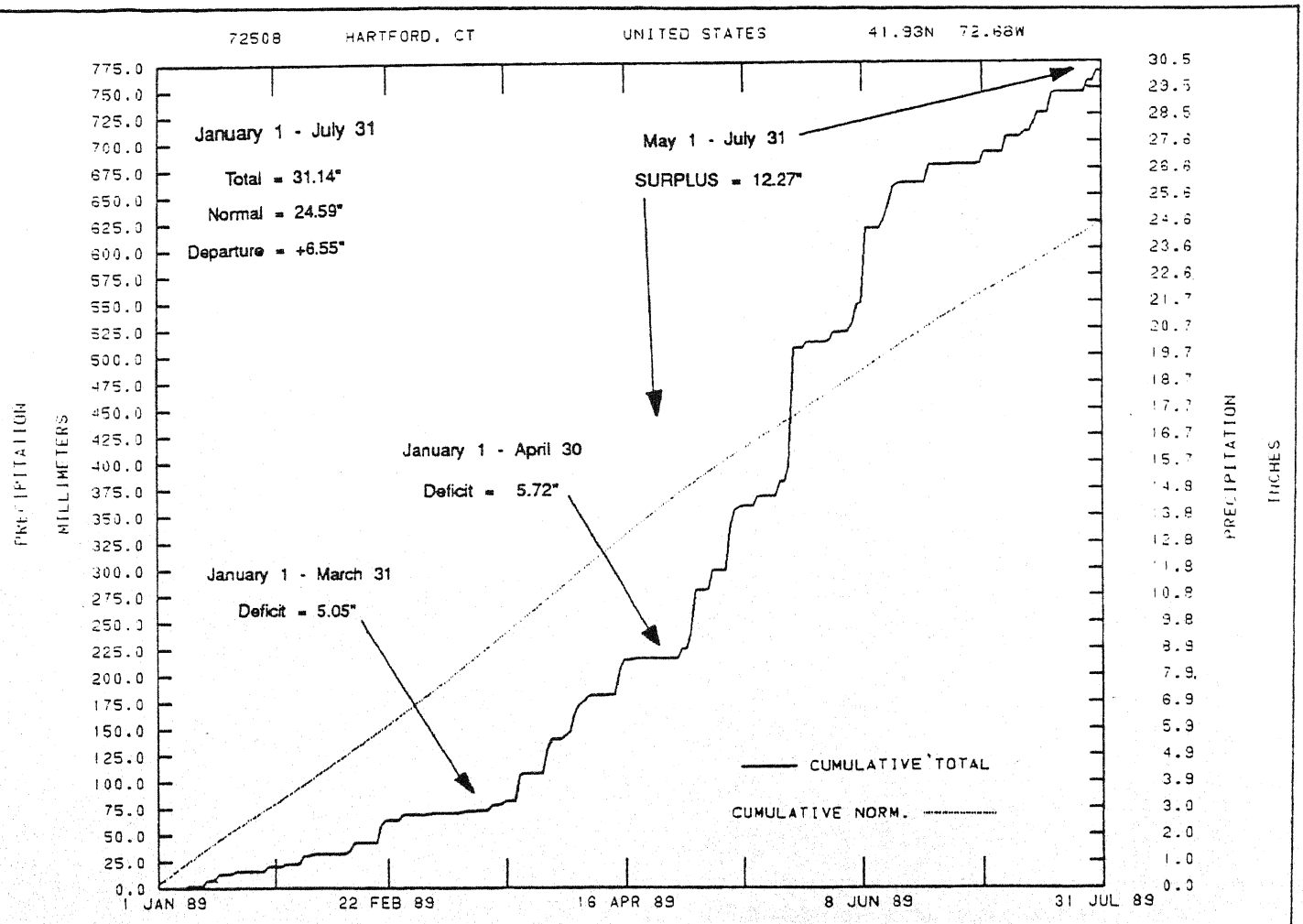


Figure 3. Cumulative daily precipitation totals for Hartford, CT during January 1 - July 31, 1989. Dashed line is cumulative normal total, and solid line is cumulative observed total. Heavy rains since May have erased deficits accumulated during the winter and early spring across the Northeast (as represented by Hartford, CT) and restored most wells and reservoirs to normal or above normal levels.

TABLE 3. JULY AVERAGE TEMPERATURES 3.5°F OR MORE ABOVE NORMAL.

STATION	DEPARTURE (°F)	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
BARROW, AK	+7.0	46.0	GLASGOW, MT	+4.3	75.0
VICTORVILLE/GEORGE AFB, CA	+6.3	84.9	PRESCOTT, AZ	+4.2	77.2
BISMARCK, ND	+5.8	76.3	BURLEY, ID	+4.2	74.7
WILLISTON, ND	+5.4	75.7	HELENA, MT	+4.1	72.0
GRAND FORKS, ND	+5.3	74.0	MISSOULA, MT	+4.1	71.4
FARGO, ND	+5.1	75.8	SHERIDAN, WY	+4.0	73.8
PHOENIX, AZ	+5.0	97.3	GLENDALE/LUKE AFB, AZ	+3.9	95.0
WORLAND, WY	+5.0	76.8	TUCSON, AZ	+3.8	90.0
JAMESTOWN, ND	+5.0	75.0	PIERRE, SD	+3.7	78.7
DICKINSON, ND	+5.0	74.4	BEEVILLE NAS, TX	+3.6	87.6
ALEXANDRIA, MN	+4.9	75.4	SALT LAKE CITY, UT	+3.6	81.1
VALDEZ, AK	+4.5	57.9	MINOT, ND	+3.6	73.0
BOZEMAN, MT	+4.4	70.2	HANCOCK/HOUGHTON CO, MI	+3.5	68.3
JUNEAU, AK	+4.4	60.2	KODIAK, AK	+3.5	57.6
RAPID CITY, SD	+4.3	77.0			

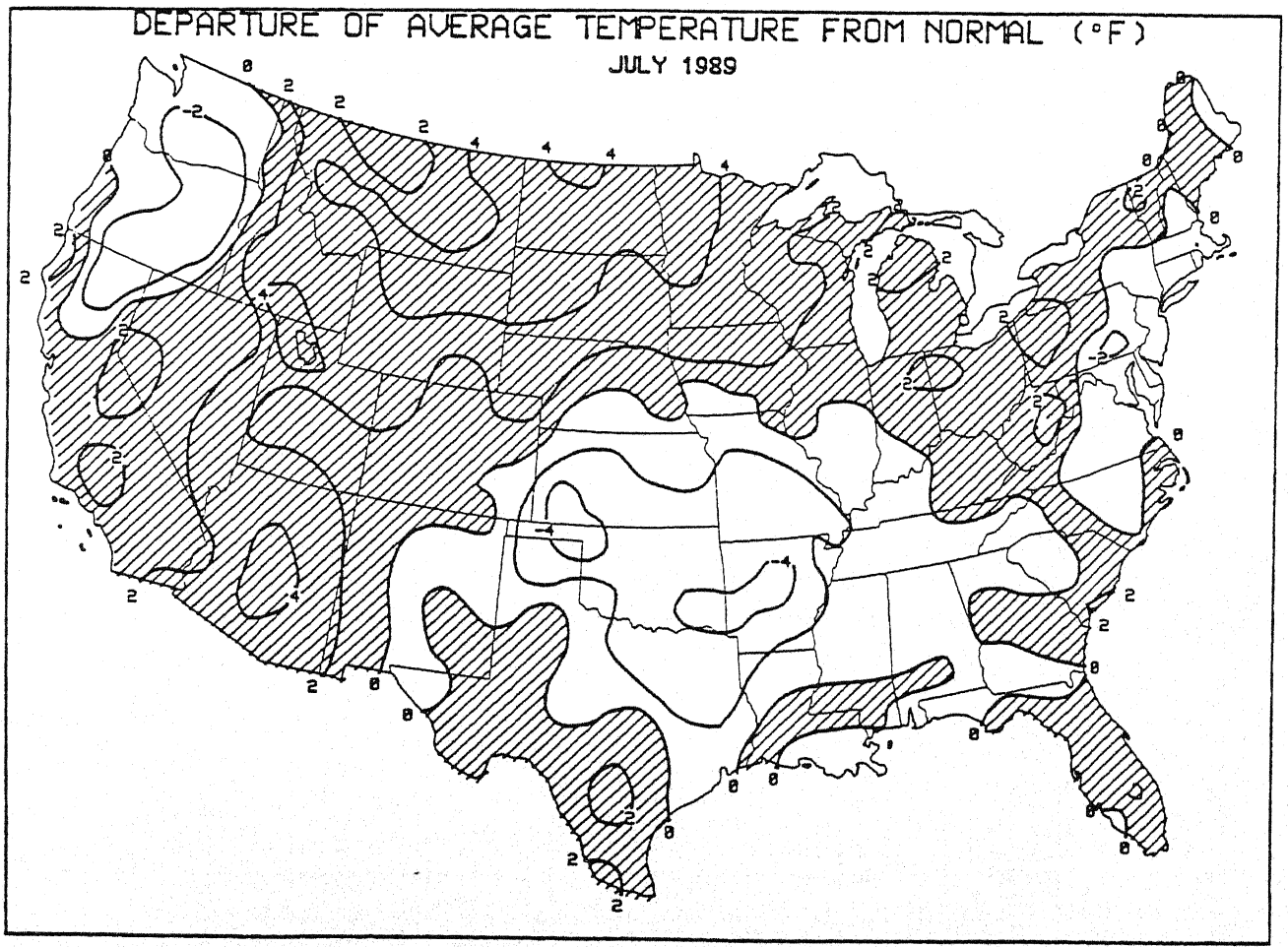


Figure 4. Temperature departure from normal (°F) for July 1989. Shaded areas are above normal. Unseasonably warm conditions prevailed across the Southwest, the Rockies, the northern Great Plains, upper Midwest, and the Great Lakes region. In contrast, cooler than normal weather covered the central Great Plains, the Southeast, the mid-Atlantic, and the Pacific Northwest.

TABLE 4. JULY AVERAGE TEMPERATURES 2.0°F OR MORE BELOW NORMAL.

STATION	DEPARTURE (°F)	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
GARDEN CITY, KS	-4.5	75.5	OKLAHOMA CITY, OK	-2.6	79.6
MCALESTER, OK	-4.1	78.6	PINE BLUFF, AR	-2.6	80.2
LITTLE ROCK, AR	-4.0	78.1	FAYETTEVILLE, AR	-2.5	75.8
GAGE, OK	-3.9	77.6	AMARILLO, TX	-2.5	76.3
BURNS, OR	-3.5	66.0	FORT SMITH, AR	-2.5	79.5
PENDLETON, OR	-3.4	70.3	WICHITA FALLS, TX	-2.5	82.9
DODGE CITY, KS	-3.4	76.6	CHANUTE, KS	-2.4	77.6
REDDING, CA	-3.2	80.2	MEDFORD, OR	-2.3	70.2
JOPLIN, MO	-3.0	77.1	KANSAS CITY/INTL., MO	-2.3	77.8
WEST PLAINS, MO	-2.9	74.8	WICHITA, KS	-2.3	79.0
TULSA, OK	-2.9	80.2	LUFKIN, TX	-2.2	81.1
DALLAS/FORT WORTH, TX	-2.9	82.8	PORTLAND, OR	-2.1	65.5
HARRISON, AR	-2.8	75.3	HARRISBURG, PA	-2.1	73.5
ENID/VANCE AFB, OK	-2.8	79.7	FT. SILL/HENRY POST AAF, OK	-2.0	81.1
SPRINGFIELD, MO	-2.7	75.4			

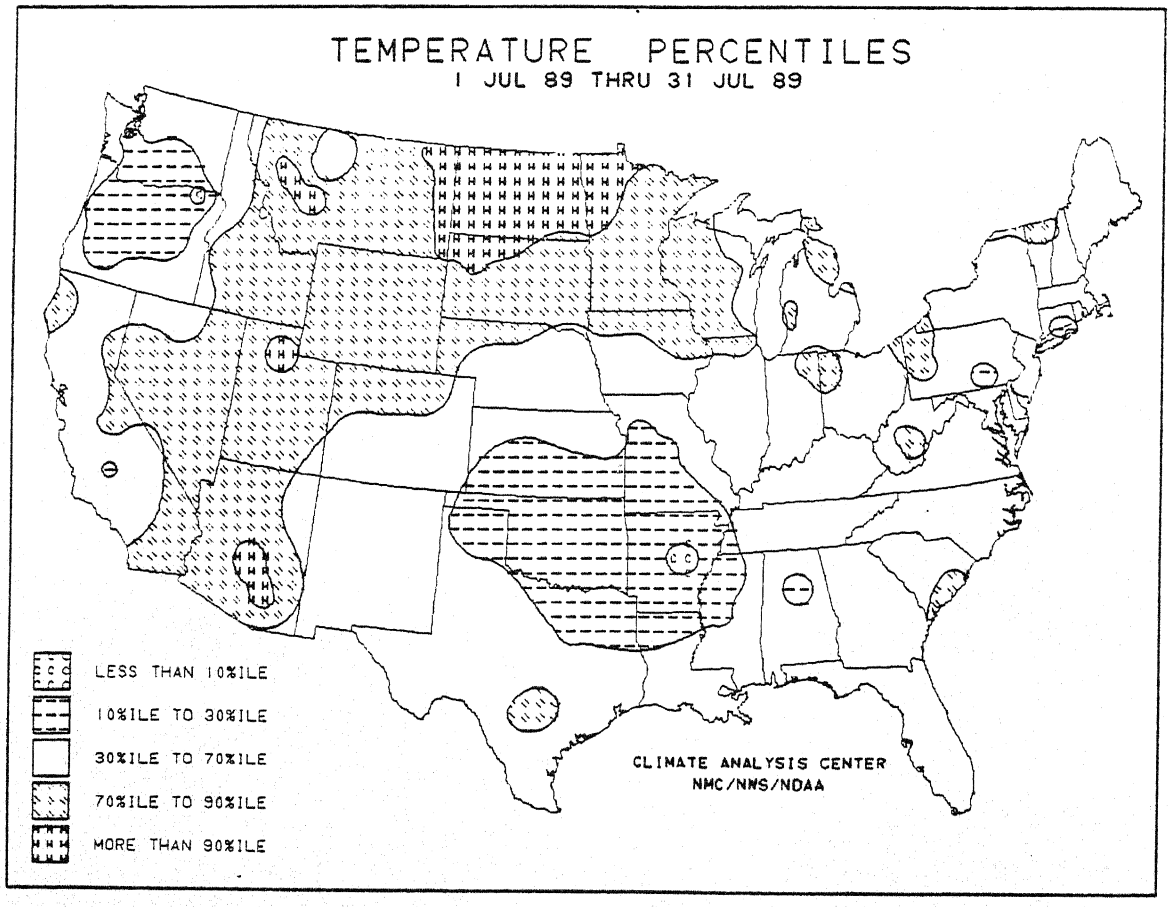


Figure 5. Temperature percentiles for July 1989. Statistically significant above normal temperatures (in the upper 90th percentile) were found in the northern Great Plains. July 1989 average temperatures were in the tenth to thirtieth percentile (cool) across the central Great Plains and lower Mississippi Valley.

TABLE 5. RECORD JULY TOTAL PRECIPITATION.

STATION	TOTAL (INCHES)	NORMAL (INCHES)	PCT. OF NORMAL	RECORD TYPE	RECORDS BEGAN
ROANOKE, VA	10.09	3.43	294.2	HIGHEST	1947
BARROW, AK	2.99	0.84	356.0	HIGHEST	1921
KAHALUI, MAUI, HI	1.21	0.36	336.1	HIGHEST	1947
BUFFALO, NY	0.93	2.94	31.6	LOWEST	1947
SAULT STE. MARIE, MI	0.53	2.98	17.8	LOWEST	1947
HOUGHTON LAKE, MI	0.37	2.89	12.8	LOWEST	1964
ALPENA, MI	0.22	3.11	7.1	LOWEST	1873
BARTER ISLAND, AK	0.00	1.04	0.0	LOWEST	1948
RENO, NV	0.00	0.28	0.0	LOWEST	1943

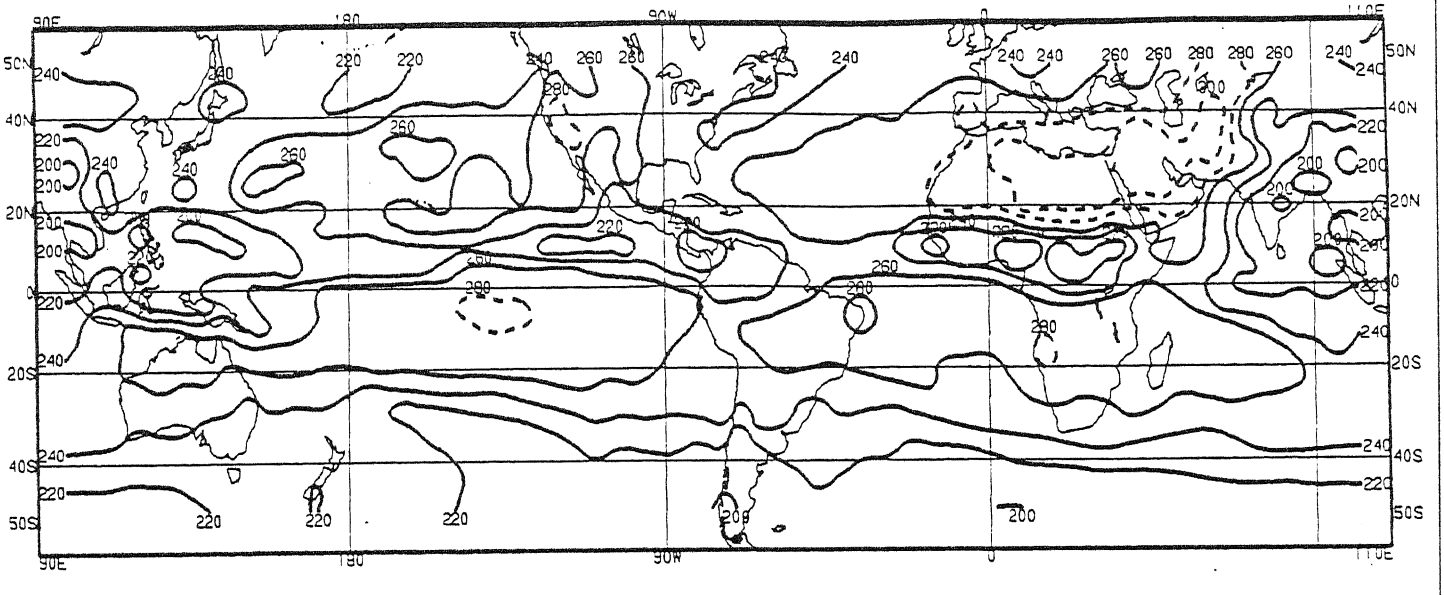
Note: Trace precipitation is considered no precipitation. Stations with no precipitation are only included if normal precipitation is 0.25 inches or more.

TABLE 6. RECORD JULY AVERAGE TEMPERATURES.

STATION	AVERAGE (°F)	NORMAL (°F)	DEPARTURE (°F)	RECORD TYPE	RECORDS BEGAN
BARROW, AK	46.0	39.0	+7.0	HIGHEST	1921
WILLISTON, ND	75.7	70.3	+5.4	HIGHEST	1947
FARGO, ND	75.8	70.7	+5.1	HIGHEST	1947
PHOENIX, AZ	97.3	92.3	+5.0	HIGHEST	1877
VALDEZ, AK	57.9	53.4	+4.5	HIGHEST	1910
TUCSON, AZ	90.0	86.2	+3.8	HIGHEST	1947
CORDOVA/MILE 13, AK	57.8	54.3	+3.4	HIGHEST	1942
LAS VEGAS, NV	93.4	90.3	+3.1	HIGHEST	1937
HOMER, AK	55.6	52.9	+2.7	HIGHEST	1951
ELY, NV	70.0	67.5	+2.5	HIGHEST	1947

TABLE 7. RECORD JULY EXTREME TEMPERATURES.

STATION	EXTREME (°F)	DATE	RECORD TYPE	RECORDS BEGAN
PHOENIX, AZ	118	4 JUL 89	HIGHEST	1938
TUCSON, AZ	114	4 JUL 89	HIGHEST	1940
MIDLAND, TX	112	2 JUL 89	HIGHEST	1949
RAPID CITY, SD	110	8 JUL 89	HIGHEST	1943
SCOTTSBLUFF, NE	109	7 JUL 89	HIGHEST	1943
ROSWELL, NM	109	2 JUL 89	HIGHEST	1973
SIOUX FALLS, SD	108	8 JUL 89	HIGHEST	1943
SAN ANTONIO, TX	106	19 JUL 89	HIGHEST	1940
SHERIDAN, WY	106	8 JUL 89	HIGHEST	1940
CARIBOU, ME	95	25 JUL 89	HIGHEST	1939
ANCHORAGE, AK	82	2 JUL 89	HIGHEST	1943
KODIAK, AK	82	2 JUL 89	HIGHEST	1949
BROWNSVILLE, TX	68	23 JUL 89	LOWEST	1937
MARQUETTE, MI	32	15 JUL 89	LOWEST	1979

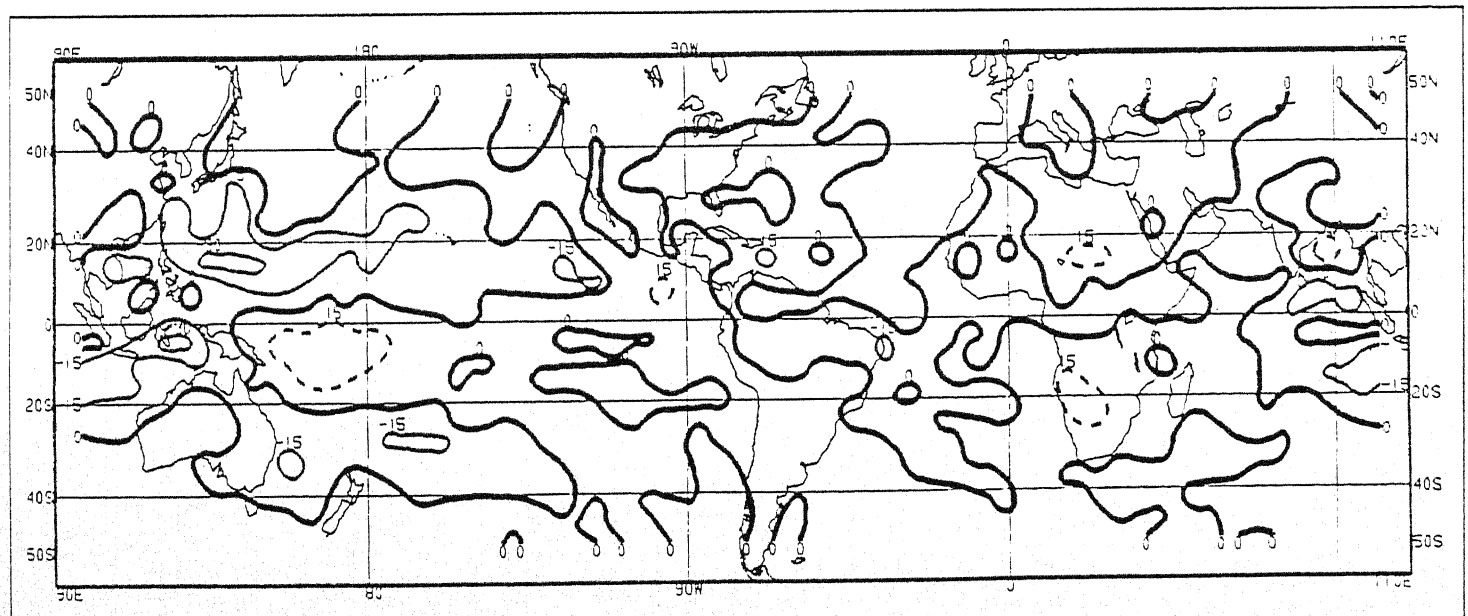


Monthly Mean Outgoing Long Wave Radiation (OLR) for July 1989

EXPLANATION

The mean monthly outgoing long wave radiation (OLR) as measured by the NOAA-9 AVHRR IR window channel by NESDIS/SRL (top). Data are accumulated and averaged over 2.5° areas to a 5° Mercator grid for display. Contour intervals are 20 Wm^{-2}, and contours of 280 Wm^{-2} and above are dashed. In tropical areas (for our purposes 20°N - 20°S) that receive primarily convective rainfall, a mean OLR value of less than 200 Wm^{-2} is associated with significant monthly precipitation, whereas a value greater than 260 Wm^{-2} normally indicates little or no precipitation. Care must be used in interpreting this chart at higher latitudes, where much of the precipitation is non-convective, or in some tropical coastal or island locations, where precipitation is primarily orographically induced. The approximate relationship between mean OLR and precipitation amount does not necessarily hold in such locations.

The mean monthly outgoing long wave radiation anomalies (bottom) are computed as departures from the 1974 - 1983 base period mean (1978 missing). Contour intervals are 15 Wm^{-2}, while positive anomalies (greater than normal OLR, suggesting less than normal cloud cover and/or precipitation) are dashed and negative anomalies (less than normal OLR, suggesting greater than normal cloud cover and/or precipitation) are solid.



Monthly Mean Outgoing Long Wave Radiation (OLR) Anomaly for July 1989